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ELECTORAL INCENTIVES, INFORMATIONAL ASYMMETRIES, AND THE POLICY BIAS TOWARD SPECIAL INTERESTS

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Abstract

Political decisions are often biased in favor of special interests at the expense of the general public, and they are frequently inefficient in the sense that the losses incurred by the majority exceed the gains enjoyed by the minority. This paper provides an explanation based on informational asymmetries and the free rider problem: (i) incumbents increase their chances of re-election by biasing policy toward groups that are better able to monitor their activities; and (ii) smaller groups are better able to overcome the free rider problem of costly monitoring so that policy will be biased in their favor. A welfare analysis examines the effect of asymmetric monitoring on voter welfare. The inefficiencies created by the policy bias are offset by a positively-valued selection bias: incumbents of above-average quality are more likely to survive voter scrutiny than are low-quality types. Journal of Economic Literature Classification Number: D72

Electoral Incentives, Informational Asymmetries, and the Policy Bias Toward Special Interests

Susanne Lohmann*

1 Introduction

An intriguing empirical regularity holds across democracies characterized by different political and economic institutions and across diverse applications such as agricultural and trade protection, economic regulation, and income transfers. Special interests enjoy political hand-outs at the expense of the general public, and this distributional bias is associated with a social deadweight loss.

An example serves to illustrate this empirical regularity. In industrialized democracies, agricultural production is supported at the expense of taxpayers and consumers, by virtue of direct transfers and subsidies as well as market interventions that indirectly improve farm income by increasing the relative price of agricultural products. In the United States, one third of the earnings from farming are due to protective agricultural policies; the corresponding numbers are one half and two thirds for the European Community and Japan, respectively. The implied levels of taxation are quite extraordinary. In 1990, the average cost of farm protection amounted to $1,400 a year for each non-farm household in industrialized societies, and this number is expected to increase to $1,800 (in 1990 prices) by the year 2000. By some estimates, a phased 50% reduction in agricultural protection would increase economic welfare in the United States, the European Community, and Japan by $32 bn (in 1985 prices); this number captures the increase in consumer surplus net of the loss in producer surplus. Agricultural protection persists in industrialized economies even though farm output contributes only 2-3% to gross domestic product and the percentage of voters who are members of farm-households has dwindled to the low single digits (Kym Anderson and Rod Tyers, 1992; The Economist, 1992).

The persistence of inefficient and biased policies is puzzling, both from an economic and a political point of view. Economic theory predicts (absent transaction costs and other complications) that inefficiencies will not persist. After all, each member of society would be made better off if such policies were eliminated and the individuals who gained from this move paid a side-payment to the losers (Ronald H. Coase, 1960). From the perspective of political science, we expect to observe the "tyranny of the majority" in a democracy, that is, a political majority acquiring benefits at the expense of a political minority (Gordon Tullock, 1959). These predictions of economic and political theory are not fulfilled empirically.

2 Informational Asymmetries and the Logic of Collective Action

Mancur Olson (1965) identifies the free rider problem of collective action as the source of the policy bias toward special interests:

> Since relatively small groups will frequently be able voluntarily to organize and act in support of their common interests, and since large groups normally will not be able to do so, the outcome of the political struggle among the various groups in society will not be symmetrical . . . . The small oligopolistic industry seeking a tariff or a tax loophole will sometimes attain its objective even if the vast majority of the population loses as a result. The smaller groups -- the privileged and intermediate groups -- can often defeat the large groups -- the latent groups -- which are normally supposed to prevail in a democracy. The privileged and intermediate groups often triumph over the numerically superior forces in the latent or large groups because the former are generally organized and active while the latter are normally unorganized and inactive (pp. 127-128).

However, in a democracy characterized by regular free elections, the free rider problem of collective action is not sufficient to explain why political decision-makers cater to special interests. Arguably, rational voters would see through political attempts to favor special interests at their expense. A disaffected majority that is aware of the policy bias could then punish its political representatives by voting them out of office.

Thus, some voter ignorance assumption appears to be a necessary component of theories explaining the policy bias toward special interests. The standard story relies implicitly on voter illusion: it assumes that political incumbents can and do systematically fool a majority of voters by favoring special interests while keeping the costs imposed on the general public below some awareness threshold.

Maintaining the assumption of voter rationality, voters can be thought of as rationally ill-informed (Anthony Downs, 1960). If information gathering is costly, then a large electorate faces a severe free rider problem of becoming informed about political alternatives that have the characteristic of being a (possibly differentiated-benefits) collective good. This problem is further exacerbated because the probability that any one vote -- whether informed or not -- makes a difference for the election outcome is usually very small.

The notion that the policy bias derives from rational voter ignorance of this kind has some surface plausibility but becomes unsustainable under further scrutiny. As a by-product of their daily lives, voters accumulate a considerable amount of information about their personal wealth and well-being. Even if they are ill-informed about policy details, they nonetheless know how well off they are, and they can base their vote on this knowledge. Indeed, one robust empirical regularity that holds across industrialized democracies is retrospective voting: incumbents who preside over good economic performance tend to be re-elected (Morris P. Fiorina, 1981). The literature on rational retrospective voting interprets such voting behavior as resulting from voters' rational inferences about some positive-valued attribute of their representatives, formed on the basis of observed economic performance (Kenneth Rogoff and Anne Sibert, 1988; Rogoff, 1990; see also Banks and Sundaram, 1993).

In the face of retrospective voting, an office-motivated incumbent must trade off gains and losses in political support that follow from favoring one group of voters rather than another. It is simply not obvious that a policymaker can generate a net gain in political support by catering to a well-informed minority at the expense of an ill-informed majority, especially if the total losses incurred by the general public exceed the total gains enjoyed by special interests. Such a policy bias reduces the welfare of a majority of voters and decreases the likelihood that they will vote for the incumbent. If economists are correct in identifying the huge deadweight losses associated with political hand-outs to special

interests, then an incumbent who eradicated such inefficiencies would preside over an increase in standards of living that would sweep him to re-election. On theoretical grounds, there is reason to believe that a policymaker who is incompletely informed about voter preferences would have incentives to set policy in an unbiased and efficient way in order to maximize the welfare of his constituents and thereby maximize his re-election chances (Donald Wittman, 1989).

This line of argument undermines the validity of standard models of interest group competition -- models of rent-seeking, political influence, directly unproductive activities, lobbying, and the like -- according to which political decisions are biased towards politically active special interests (Tullock, 1980; Sam Peltzman, 1976; Gary S. Becker, 1983; Jagdish N. Bhagwati, 1982; Ronald J. Findlay and Stanislaw Wellisz, 1982; Stephen P. Magee, William A. Brock, and Leslie Young, 1989). The "reduced-form" approach that is standard in the literature black boxes the individual incentives to become informed and exert political pressures, as well as the incentives of political representatives to respond to such political pressures (Susanne Lohmann, 1995). For example, Becker's (1976) theory of interest group competition consists of a political pressure production function and a political influence function. The pressures generated by an interest group are assumed to be a function of the size of the group and the resources spent per group member. The likelihood that the group is successful in influencing a policy decision to its advantage is assumed to be a function of the political pressures it generates relative to competing interest groups.

The reduced-form assumptions underlying such models are justified informally with reference to the free rider problem of participating in costly collective action and of costly information gathering (Peltzman, 1976). Because these models are lacking a formal microfoundation, their comparative statics are vulnerable to the Lucas-critique. The decision rules of private agents and their political representatives, which are buried in the reduced-form assumptions, may not be invariant to changes in exogenous parameters (Robert E. Lucas, 1976).

Two other sources of the policy bias toward special interests have been identified by economists and political scientists. One explanation asserts that policymakers favor organized interests in exchange for campaign contributions (Magee, Brock, and Young, 1989; David P. Baron, 1994). Another explanation invokes "legislative failure," that is,

legislative norms or legislative organization that are dysfunctional from an aggregate welfare perspective. The canonical story has representatives in the United States Congress approve each others' inefficient pork-barrel projects in quid-pro-quo logrolls (Barry R. Weingast, Kenneth A. Shepsle, and Christopher Johnsen, 1981). Alternatively, "high demanders" are said to self-select onto powerful Congressional committees that have jurisdiction over the pork-barrel projects their districts benefit from (Shepsle, 1978).

The explanatory power of an approach that emphasizes the role of monetary contributions made by interest groups is quite limited; the same holds for an explanation that relies on specific features of the Congress. The phenomenon to be explained -- the policy bias toward special interests -- is observed across countries characterized by different political processes and institutions. Inefficient forms of public policy are common not only in the United States, but also in countries where monetary contributions to political candidates play an insignificant role, in some cases because campaigns are publicly financed. Similarly, pork-barrel politics are not only characteristic of the Congress, but also of legislatures controlled by strong political parties that enforce majoritarian party-line voting rather than universalistic logrolls or deference to stacked committees. It is not obvious whether or how the legislative failure argument would apply to the latter type of legislatures.

3 Toward a Theory of the Policy Bias

The purpose of this article is to analyze the link between informational asymmetries, the Olsonian free rider problem, and the policy bias toward special interests in a framework with rational, utility-maximizing agents.

First, the theory is based on the assumption that agents are rational. This assumption allows voters to be ill-informed, but it restricts them to understand the nature of the game they are involved in: rational voters cannot be systematically fooled. Second, the theory demonstrates whether and how an office-motivated incumbent can achieve a net gain in political support if he biases policy toward a well-informed minority at the expense of an ill-informed majority, even if the losses imposed on the general public exceed the gains enjoyed by special interests. Third, the underlying informational asymmetry is derived endogeneously and linked explicitly to the free rider problem. Fourth, the theory is relatively simple and institution-free. It does not rely on specific features of political

processes and institutions that govern any one policy issue or country, except for the one feature that modern democracies have in common: regular free elections in which a majority of the electorate can vote the incumbent government out of office. According to the principle of Occam's Razor (entities should not be multiplied needlessly) a simple explanation is preferable to a more complex one that invokes idiosyncratic distortions.

The central hypothesis is that special interests prevail because they are better able to monitor whether an incumbent policymaker is following their agenda than are diffuse interests. For example, farm households are generally well-informed about legislation dealing with agricultural price supports and subsidies, and they can assess fairly accurately whether and how their political representatives contributed to the passage of an agricultural bill or to the size of price supports and subsidies the bill promises to deliver. In contrast, the huge majority of non-farm households is unlikely to know that an agricultural bill was passed at all; let alone are they aware of the details of the legislation. Members of the general public may well notice the decrease in their real disposable income generated by the increase in food prices and taxes, but they can assign political blame for the loss in their standards of living only very imprecisely.

Because special interests are better able to monitor the quality of their political representation, an office-motivated policymaker has electoral incentives to bias policy to their advantage. By doing so, the incumbent can mimic an increase in quality vis-à-vis special interests at the expense of an apparent decrease in quality vis-à-vis the general public. Compared to the ill-informed majority, the well-informed minority places a higher weight on the possibility that the observed policy outcome is caused by the policymaker's quality rather than other random factors. The reason is that the signal extraction problem solved by special interests is subject to less "noise" confounding their inferences. As a consequence, the incumbent gains more political support among members of the minority than he loses among members of the majority.

The incumbent's opportunistic behavior creates competitive incentives for individuals to acquire better monitors of political performance. If the incentives to become informed are asymmetric, political outcomes will be biased in favor of well-informed individuals at the expense of their ill-informed counterparts. One source of asymmetry is the within-group free rider problem of costly information acquisition. Being smaller in number, special interests overcome this problem to a greater degree than does the general public.

On a more positive note, the voters' retrospective voting rule causes a welfare-improving selection bias. Incumbents of above-average quality are more likely to survive voter scrutiny and remain in office. While elections create incentives for policymakers to follow suboptimal policies for re-election purposes, they also serve to get rid of low-quality political candidates.

4 Policy and Selection Biases

The model consists of N voters indexed $h = 1, \ldots, N$, where $N \geq 3$ and N is an odd number. The electorate can be decomposed into two homogeneous groups, a majority whose M individual members are indexed with the lower-case letter j, and a minority whose N-M individual members are indexed by i, where $j = 1, \ldots, M$, $i = M+1, \ldots, N$, and $\frac{N+1}{2} \leq M < N$. These two groups will also be referred to as the general public and the special interest. The members of each group are homogeneous; the parameters that are common to all members of the majority and minority are indexed with the capital letters J and I, respectively.

Each voter h desires the incumbent policymaker to take a favorable action $\hat{a}_h$; the voter's utility decreases quadratically with the distance between the action $a \in R$ taken by the policymaker and the voter's ideal point $\hat{a}_h$. The general public's preferences over the policymaker's action conflict with those of the special interest: $\hat{a}_J \neq \hat{a}_I$.

Political candidates differ in some positive-valued attribute, labelled candidate quality, that has the potential to improve the well-being of the electorate when they are in power.[1] (An extension in which candidates differ in their policy positions, about which voters have conflicting preferences, will be discussed later on.) Formally, political candidates are characterized by a quality parameter q, which is randomly drawn from a normal distribution with zero mean and strictly positive but finite variance σ_q^2. Voter utility increases with the incumbent's quality.[2] The majority and the minority thus have a common interest: to ensure that a policymaker of above-average quality sets policy.

In summary, voter h's utility level in each time period is given by

$$(1) \qquad U_h = -\frac{1}{2}(a - \hat{a}_h)^2 + q \ .$$

Neither the general public nor the special interest can directly observe the action taken by the incumbent policymaker; nor can they directly observe candidate quality. People can, however, form indirect and imperfect inferences about the incumbent's quality based on observed policy outcomes. Formally, I assume that each individual observes the degree to which she is favored by the outcome of the policy process,

$$(2) \qquad \Pi_h = -\frac{1}{2}(a - \hat{a}_h)^2 + q + p_h \ ,$$

where p_h is an individual-specific process shock, which is randomly drawn from a normal distribution with zero mean and strictly positive but finite variance $\sigma_{p,h}^2$. The individuals' process shocks are independently distributed. (An extension allowing for correlated shocks will be discussed later on.) In a simple way, the process shock captures the random nature of the interaction of multiple (unmodelled) actors and circumstances that affect the outcome of complex political and economic processes and thus impact on voter utility.

In practice, special interests are better informed than is the general public: $\sigma_{p,J}^2 > \sigma_{p,I}^2$. They are better able to disentangle whether observed policy outcomes are caused by the incumbent's action, his quality, or other random factors confounding their inferences. My analysis is, however, not predicated on the assumption that the minority group is better informed than is the majority group. Instead, I first derive the equilibrium without specifying which group (if any) enjoys an informational advantage: $\sigma_{p,J}^2 \gtrless \sigma_{p,I}^2$. Later on, the informational asymmetry across groups is derived endogeneously by assuming that each individual h can pay a cost c_h to lower the variance $\sigma_{p,h}^2$ of her observation Π_h.

Political candidates care about aggregate welfare, or they derive utility from being in power. Their utility level in each time period is given by

$$(3) \qquad \sum_{h=1}^{N} U_h + S \ ,$$

where the first term stands for aggregate welfare; the index variable S takes on the value $\overline{S}$ if the political candidate is in power in the time period under consideration and the value

zero otherwise, $\overline{S} \in [0,\infty)$. The parameter $\overline{S}$ captures the degree to which political candidates are office-motivated: it is equal to zero if they are concerned only with aggregate welfare and goes to infinity as the (re-)election goal becomes dominant.

The expression for aggregate welfare weighs the individual utilities equally. One distinguishing characteristic of special interests might be that they care more strongly about the policy issue under consideration than does the general public. This possibility is easily integrated into the model by having the policymaker weigh minority utility more heavily. The qualitative results of the analysis, which defines policy and selection biases relative to the outcome that maximizes aggregate welfare, are not affected.

Finally, I assume that candidates themselves are uncertain about their quality. [Supplemental Appendix I (available upon request) discusses an extension in which candidates are privately informed about their quality.] One plausible interpretation of candidate quality has both candidates and voters imperfectly informed about the fit between the candidates' known positions and the unknown characteristics of the political and economic environment. For example, candidates might differ in their ideology about the workings of the economy (John E. Roemer, 1994), in which case candidate quality would stand for the objective accuracy of their ideology.

The assumption that candidates do <u>not</u> enjoy an informational advantage vis-à-vis voters simplifies the model but also serves an important analytical purpose. It allows me to isolate the policy and selection effects that arise because of informational asymmetries across voters and to avoid confounding effects arising from informational asymmetries between candidates and voters. I will demonstrate that the policy bias arises because of the strategic interaction between an incumbent and his voters and not between different types of incumbents. The bias is driven by the incumbent's desire to make voters believe that he is of above-average quality, independently of his actual quality, and not by the incumbent's desire to separate himself from other, lower-quality types, as might be suggested by the standard model of costly signaling (A. Michael Spence, 1973).

The model has two time periods. [Supplemental Appendix II (available upon request) argues that the qualitative results -- the policy and selection biases as well as retrospective voting -- are robust in the presence of an infinite horizon.] Time superscripts are omitted whenever possible to avoid notational clutter. For simplicity, I assume that second-period utilities are not discounted.

[FIGURE 1 ABOUT HERE]

Figure 1 lists the time sequence of events. In the first period, the incumbent policymaker takes the action a_1. Nature then draws the policymaker's quality q and the individual-specific process shocks, $p_1, \ldots, p_N$. Each voter h subsequently observes the policy outcome Π_h and chooses whether to vote for the incumbent $(v_h = 1)$ or the challenger $(v_h = 0)$. The incumbent remains in power if he receives a majority of the vote, that is, at least $\frac{N+1}{2}$ votes. Otherwise he is replaced by a challenger. The election winner then takes the action a_2. If the challenger won, his quality q is a "fresh draw." Finally, the game ends, and the players' payoffs are realized.

The equilibrium concept is a refinement of Bayesian Nash equilibrium. Voters are restricted to use weakly undominated voting strategies. This refinement is invoked to eliminate implausible voting equilibria of the following kind. Suppose each voter believes that all other voters will vote for one candidate independently of their private information. Then this candidate will win the election for sure. As a consequence, each voter is indifferent between voting for or against this candidate, and she may thus choose to follow a pure strategy of voting for this candidate independently of her private information. Thus, one candidate may win the election even though it is common knowledge that a majority of voters expect to be better off if the other candidate won.

Another complication arises in the voting setting analyzed here: the "swing voter's curse" (Timothy J. Feddersen and Wolfgang Pesendorfer, forthcoming). Each voter has private information (the individual-specific realization of the policy outcome, Π_h) about a common value that affects the utility levels of all voters (the incumbent's quality q). As a consequence, each individual has incentives to condition her vote on the information revealed by her vote being decisive for the election outcome. Her voting decision is based on her posterior expectation about the incumbent's quality, $E(q \mid \Pi_h, D)$, which is conditioned not only on her private information but also on the information implied by exactly $\frac{N-1}{2}$ other individuals voting for the incumbent and $\frac{N-1}{2}$ other individuals

voting for the challenger, where E is an expectations operator and D stands for the information implied by the voter casting the decisive vote.

DEFINITION: A Bayesian Nash equilibrium, refined to rule out weakly dominated strategies, is given by the incumbent's first-period action a_1 *; the individuals' voting rule v_h *(Π_h), and the election winner's second-period action a_2 *. (The superscript * indexes equilibrium values.) The players' strategies are best responses. The voters use Bayes' rule to update their beliefs.

PROPOSITION 1: The unique[3] Bayesian Nash equilibrium, refined to rule out weakly dominated strategies, is given by the incumbent's first-period action, which is subject to a policy bias,

$$(4) \qquad a_1 * = \hat{a}_J \frac{M(1+\phi_J \bar{S}\varepsilon)}{N + M\phi_J \bar{S}\varepsilon + (N-M)\phi_I \bar{S}\varepsilon} + \hat{a}_I \frac{(N-M)(1+\phi_I \bar{S}\varepsilon)}{N + M\phi_J \bar{S}\varepsilon + (N-M)\phi_I \bar{S}\varepsilon};$$

the individuals' retrospective voting rule,

$$(5) \qquad v_h * (\Pi_h) = \begin{cases} 1 & \text{if } \Pi_h \geq -\frac{1}{2}(a_1 * - \hat{a}_h)^2 \\ 0 & \text{otherwise} \end{cases};$$

and the election winner's unbiased second-period action,

$$(6) \qquad a_2 * = \hat{a}_J \frac{M}{N} + \hat{a}_I \frac{N-M}{N},$$

where $\phi_h \equiv f_h(0)$, f_h is the probability distribution function of $q + p_h$, and $\varepsilon \equiv \frac{(N-1)!}{\left(\frac{N-1}{2}\right)!\left(\frac{N-1}{2}\right)!}\left(\frac{1}{2}\right)^{N-1}$.

PROOF:

The model is solved by backwards induction. In the second (and last) period of the game, there are no re-election incentives so that the incumbent's action maximizes second-period aggregate welfare. His first-order condition is given by

$$(7) \qquad \frac{d\left[\sum_{h=1}^{N} U_h^{t=2}(a_2) + \bar{S}\right]}{d\,a_2} = -M(a_2 - \hat{a}_I) - (N-M)(a_2 - \hat{a}_I) = 0 \ .$$

His second-order condition has negative sign:

$$(8) \qquad \frac{d^2\left[\sum_{h=1}^{N} U_h^{t=2}(a_2) + \bar{S}\right]}{(d\,a_2)^2} = -N < 0 \ .$$

It follows that the equilibrium second-period action a_2* is given in equation (6) in Proposition 1.

At the end of the first period, each individual must decide whether to vote for the incumbent or the challenger. Her vote cannot ex post change her first-period utility; it can only influence her second-period expected utility. Each individual votes for the incumbent if she expects to be better off if the incumbent remained in power, given her private information and the information implied by her vote being decisive. Since both the incumbent and the challenger take the same action in the second period, the only difference between the two candidates lies with their expected qualities. The individual has no information (other than her prior) about the challenger's quality so that the challenger's expected quality is zero. She cannot directly observe the incumbent's quality; but at the time of the vote each individual observes the policy outcome. The individual can use her private information and her knowledge about the equilibrium to form an estimate of the incumbent's quality. Her inferences are confounded by the individual-specific process shock.

In equilibrium, $a_1 = a_1$* holds, implying that equation (2) is equivalent to

$$(9) \qquad q + p_h = \Pi_h + \frac{1}{2}(a_1 * - \hat{a}_h)^2 \ .$$

Voter h cannot directly observe the individual components of the left hand side of equation (9), q and p_h, but she knows that the sum $q + p_h$ is equal to the right hand side of this equation. She is privately informed about the value of the first term on the right hand side, Π_h; the value of the second term, $\frac{1}{2}(a_1 * - \hat{a}_h)^2$, is not directly observed but is known in equilibrium.

Consider first the case in which voter h votes naively, that is, solely based on her private information without taking into account the information implied by her casting the decisive vote. Her expectation of the incumbent's quality solves the standard signal extraction problem (Morris H. DeGroot, 1970 p. 167). The value $\Pi_h + \frac{1}{2}(a_1 * - \hat{a}_h)^2$ can be thought of as a random sample from a normal distribution with unknown mean q and variance $\sigma_q{}^2$, where the prior distribution of the mean q is normal with mean zero and variance $\sigma_{p,h}{}^2$. Equation (9) thus implies that voter h's posterior expectation about the incumbent's quality, $E(q \mid \Pi_h)$, is a function of the observed policy outcome Π_h:

$$(10) \qquad E(q \mid \Pi_h) = \left(\frac{\sigma_q{}^2}{\sigma_q{}^2 + \sigma_{p,h}{}^2} \right)(q + p_h) = \left(\frac{\sigma_q{}^2}{\sigma_q{}^2 + \sigma_{p,h}{}^2} \right)[\Pi_h + \frac{1}{2}(a_1 * - \hat{a}_h)^2] \ .$$

As I will argue later on, equation (10) contains the crucial intuition underlying the policy bias. The better informed is voter h, or the lower is the variance $\sigma_{p,h}{}^2$ of her process shock p_h, the higher is the weight she places on the observation Π_h, and the lower is the weight she places on her prior expectation of the incumbent's quality, zero. Moreover, the voter subtracts $-\frac{1}{2}(a_1 * - \hat{a}_h)^2$ from the policy outcome Π_h, thereby rationally discounting the degree to which the policy outcome is favorable by the amount of the equilibrium policy bias.

The voter supports the incumbent if her posterior expectation about the incumbent's quality, $E(q \mid \Pi_h)$, exceeds the challenger's expected quality, zero. Equivalently, she votes for the incumbent if

$$(11) \qquad \Pi_h + \frac{1}{2}(a_1 * - \hat{a}_h)^2 \geq 0 \ .$$

A naive voter thus follows the voting rule $v_h *$ given in equation (5) in Proposition 1.

I now examine whether a sophisticated voter, who takes into account the information implied by her casting the decisive vote, will also follow this rule. In equilibrium, the voter

takes as given that all other voters will do so. She knows that if her vote is pivotal it must be the case that equation (11) holds for $\frac{N-1}{2}$ voters other than herself and

$$(12) \qquad \Pi_h + \frac{1}{2}(a_1 * - \hat{a}_h)^2 < 0$$

holds for the remaining $\frac{N-1}{2}$ voters. Since there is no uncertainty about the policymaker's action a_1 in equilibrium ($a_1 = a_1 *$), equation (2) implies that equations (11) and (12) are equivalent to

$$(13) \qquad q + p_h \geq 0$$

and

$$(14) \qquad q + p_h < 0 \ ,$$

respectively. Given the symmetry of the underlying model, and noting that $q + p_h = 0$ is a zero probability event, it follows that

$$(15) \qquad E(q \mid D) = 0 \ .$$

That is, the information implied by the individual casting the decisive vote per se does not shift her posterior away from her prior expectation about the incumbent's quality. The voter's private information is critical in determining whether she believes the incumbent to be of above-average quality:

$$(16) \qquad E(q \mid \Pi_h, D) \begin{cases} \geq 0 & \textit{iff } E(q \mid \Pi_h) \geq 0 \\ < 0 & \textit{iff } E(q \mid \Pi_h) < 0 \end{cases} .$$

Thus, the individual supports the incumbent if and only if equation (11) holds. It follows that a sophisticated voter employs the equilibrium voting rule $v_h *$ given in equation (5) in Proposition 1.

The coincidence of the sophisticated and naive voting rules depends crucially on the symmetry of the underlying model. In asymmetric settings, the naive voting strategy is not generally the best response for a sophisticated voter, who instead follows a retrospective voting rule with a different cutpoint. [Supplemental Appendix III (available upon request) demonstrates that the qualitative features of the equilibrium -- the policy and selection

biases as well as retrospective voting -- are robust with respect to the (a)symmetry of the model.]

In the first period, the incumbent trades off the first-period welfare and second-period re-election consequences of his action a_1. His first-order condition is given by

$$(17)\quad \frac{d\left[\sum_{h=1}^{N} U_h^{t=1}(a_1) + \bar{S} + E\sum_{h=1}^{N} U_h^{t=2} + \Pr(S=\bar{S} \mid a_1)\,\bar{S}\right]}{d\,a_1} =$$

$$-M(a_1-\hat{a}_J) - (N-M)(a_1-\hat{a}_I) + \frac{d\Pr(S=\bar{S}\mid a_1)}{d\,a_1}\,\bar{S} = 0\,,$$

where $\Pr(S=\bar{S} \mid a_1)$ is the probability that the incumbent survives as a function of his action a_1, and

$$(18)\quad \frac{d\Pr(S=\bar{S}\mid a_1)}{d\,a_1} = \sum_{h=1}^{N}\left[\frac{\partial \Pr[S=\bar{S} \mid \Pr(v_h=1)]}{\partial \Pr(v_h=1)}\,\frac{\partial \Pr(v_h=1\mid a_1)}{\partial\, a_1}\right] = \varepsilon \sum_{h=1}^{N}\left[\frac{\partial \Pr(v_h=1\mid a_1)}{\partial\, a_1}\right],$$

noting that $\frac{\partial \Pr[S=\bar{S} \mid \Pr(v_h=1)]}{\partial \Pr(v_h=1)} \equiv \varepsilon$. The policymaker wins the election with any number of votes ranging from a simple majority to unanimity. Voter h is a member of some but not all possible supporting coalitions that form a majority. An increase in the probability that individual h votes for the incumbent leads to an ε-increase in the probability that the incumbent remains in power, where ε is the probability that the voter is member of a supporting majority, averaged across all possible majority coalitions. Supplemental Appendix IV (available upon request) proves that this probability is equal to $\frac{(N-1)!}{\left(\frac{N-1}{2}\right)!\left(\frac{N-1}{2}\right)!}\left(\frac{1}{2}\right)^{N-1}$; that is, the number of coalitions of $\frac{N-1}{2}$ voters other than individual h supporting the incumbent and $\frac{N-1}{2}$ voters other than individual h opposing the incumbent, multiplied by the probability that each of these coalitions is formed. (Note that the unconditional probability that a given voter supports the incumbent is one half, as is the probability that this voter opposes the incumbent.) The formula for ε implies that ε is strictly positive, decreases with N, and converges to zero as N goes to infinity.

The probability that individual h supports the incumbent's candidacy is a function of the action a_1:

$$(19)\quad \Pr(v_h = 1 \mid a_1) = \Pr[\Pi_h \geq -\frac{1}{2}(a_1 * - \hat{a}_h)^2] = \Pr[q + p_h \geq \frac{1}{2}(a_1 - \hat{a}_h)^2 - \frac{1}{2}(a_1 * - \hat{a}_h)^2]$$

$$= 1 - F_h[\frac{1}{2}(a_1 - \hat{a}_h)^2 - \frac{1}{2}(a_1 * - \hat{a}_h)^2] ,$$

where F_h is the cumulative distribution function of $q+p_h$. The incumbent's probability of survival thus varies with his action a_1:

$$(20)\quad \frac{d\Pr(S = \bar{S} \mid a_1)}{d\, a_1} = -\varepsilon M (a_1 - \hat{a}_J) f_J[\frac{1}{2}(a_1 - \hat{a}_J)^2 - \frac{1}{2}(a_1 * - \hat{a}_J)^2]$$

$$- \varepsilon (N - M)(a_1 - \hat{a}_I) f_I[\frac{1}{2}(a_1 - \hat{a}_I)^2 - \frac{1}{2}(a_1 * - \hat{a}_I)^2] =$$

$$- \varepsilon M (a_1 - \hat{a}_J)\ \phi_J - \varepsilon (N - M)(a_1 - \hat{a}_I)\ \phi_I ,$$

noting that $\frac{1}{2}(a_1 - \hat{a}_h)^2 - \frac{1}{2}(a_1 * - \hat{a}_h)^2 = 0$ in equilibrium.

The policymaker's first-order condition (17) can then be rewritten as

$$(21)\quad \frac{d\left[\sum_{h=1}^{N} U_h{}^{t=1}(a_1) + \bar{S} + E\sum_{h=1}^{N} U_h{}^{t=2} + \Pr(S = \bar{S} \mid a_1)\,\bar{S}\right]}{d\, a_1} =$$

$$- M(a_1 - \hat{a}_J)(1 + \phi_J \bar{S}\,\varepsilon) - (N - M)(a_1 - \hat{a}_I)(1 + \phi_I \bar{S}\,\varepsilon) = 0 .$$

His second-order condition has negative sign:

$$(22)\quad \frac{d^2\left[\sum_{h=1}^{N} U_h{}^{t=1}(a_1) + \bar{S} + E\sum_{h=1}^{N} U_h{}^{t=2} + \Pr(S=\bar{S} \mid a_1)\,\bar{S}\right]}{(d\, a_1)^2} = -M(1+\phi_J\,\bar{S}\,\varepsilon) - (N - M)(1+\phi_I\,\bar{S}\,\varepsilon) < 0 .$$

It follows that the equilibrium first-period action, $a_1 *$, is given in equation (4) in Proposition 1.

It remains to be shown that the equilibrium characterized in Proposition 1 is unique. First, equations (21) and (22) imply that the incumbent's first-period action is the unique best response given the voters' retrospective decision rule. A mixed strategy is ruled out because the incumbent is never indifferent between taking one action or another. Second, I establish that the individuals' retrospective voting rule (5) is the unique best response independently, in effect, of the incumbent's first-period strategy: in equilibrium each voter h fully discounts the effect of the incumbent's action on her utility so that her support for the incumbent depends only on the realization of the random variable $q + p_h$ [equations (11) and (13) are equivalent in equilibrium; the same holds for equations (12) and (14)]. Moreover, the voter's decision rule is independent of the election winner's second-period strategy, and trivially so, since the election winner's action does not depend on the election outcome. All voters necessarily follow the same retrospective decision rule. Once they have discounted the (differential) effects of the first-period action on their utilities, they have identical preferences for retaining an incumbent of above-average quality and identical equilibrium knowledge about other individuals' information sets conditional on their casting the decisive vote. The voters differ only with regard to their private information, which determines on which side of the voting cutpoint they end up, as specified in equation (5). The cutpoint of their retrospective voting rule is uniquely zero. Suppose instead that this cutpoint were nonzero. Then for some realizations of the observation Π_h or, equivalently, of the random variable $q + p_h$, individual h would be strictly better (worse) off voting for the challenger even though the voting rule in equation (5) requires her to vote for (against) the incumbent. The latter claim follows from the proof in Supplemental Appendix III (available upon request). Finally, mixed strategies of voting for one or the other candidate are ruled out, and abstentions are dominated.[4] For each possible realization of $q + p_h$, the voter has a strict preference to vote for or against the incumbent. The only exception is the probability zero event $q + p_h = 0$, for which the voter is indifferent.[5] Third, equations (7) and (8) imply that the election winner's second-period action is the unique best response independent of the other players' strategies. A mixed strategy is ruled out because the election winner is never indifferent between taking one action or another.

PROPOSITION 2: The policy bias is zero if there is no conflict of interest or informational disparity between the majority and minority, or if the incumbent places zero weight on the re-election objective:

(23) $a_1 * = a_2 *$ *if* $\hat{a}_J = \hat{a}_I$, *or if* $\sigma_{p,J}^2 = \sigma_{p,I}^2$, *or if* $\bar{S} = 0$.

Otherwise policy is biased toward the well-informed group at the expense of the ill-informed group:

(24) $|a_1 * - \hat{a}_J| > |a_2 * - \hat{a}_J|$ *and* $|a_1 * - \hat{a}_I| < |a_2 * - \hat{a}_I|$ *if* $\sigma_{p,J}^2 > \sigma_{p,I}^2$;

$|a_1 * - \hat{a}_J| < |a_2 * - \hat{a}_J|$ *and* $|a_1 * - \hat{a}_I| > |a_2 * - \hat{a}_I|$ *if* $\sigma_{p,J}^2 < \sigma_{p,I}^2$.

The size of the policy bias increases with the conflict of interest and the informational disparity between the two groups and with the weight the incumbent places on the re-election objective:

(25) $$sign\left(\frac{d\,|a_1 * - a_2 *|}{d\,|\hat{a}_J - \hat{a}_I|}\right) = sign\left(\frac{d\,|a_1 * - a_2 *|}{d\,|\sigma_{p,J}^2 - \sigma_{p,I}^2|}\right) = sign\left(\frac{d\,|a_1 * - a_2 *|}{d\,\bar{S}}\right) > 0 .$$

PROOF:

The second-period action $a_2 *$ is a weighted average of the two groups' ideal points, with the weights reflecting the relative size of the two groups [see equation (6)]. Since the second-period action maximizes second-period aggregate welfare, it serves as a normative benchmark. A policy bias is obtained if the action taken by an office-motivated incumbent in the first period, $a_1 *$, differs from this benchmark. The difference is given by

(26) $$a_1 * - a_2 * = \frac{M(N-M)\,(\hat{a}_J - \hat{a}_I)\,(\phi_J - \phi_I)\,\bar{S}\,\varepsilon}{N + M\phi_J\,\bar{S}\,\varepsilon + (N-M)\phi_I\,\bar{S}\,\varepsilon} .$$

The conditions under which there is no policy bias, stated in equation (23) in Proposition 2, follow straightforwardly from equation (26), noting that $\phi_J = \phi_I$ is equivalent to $\sigma_{p,J}^2 = \sigma_{p,I}^2$. These results demonstrate that the conflict of interest, $\hat{a}_J \neq \hat{a}_I$, and the informational disparity between the majority and minority, $\sigma_{p,J}^2 \neq \sigma_{p,I}^2$, play a crucial role for the policy bias, $a_1 * \neq a_2 *$, as does the incumbent's re-election objective, $\bar{S} > 0$.

If none of the conditions in equation (23) is fulfilled, the incumbent systematically favors the group that is better able to monitor his performance. Equation (26) implies equation (24); that is, if $\phi_J < \phi_I$ or, equivalently, $\sigma_{p,J}^2 > \sigma_{p,I}^2$, then $\hat{a}_J > \hat{a}_I$ implies $a_1 * < a_2 *$ and $\hat{a}_J < \hat{a}_I$ implies $a_1 * > a_2 *$; and vice versa. The direction of the policy bias depends only on the informational disparity between the two groups.

The size of the policy bias increases with the conflict of interest and the informational disparity between the two groups and with the weight the incumbent places on the re-election objective. These comparative statics, stated in equation (25) in Proposition 2, also follow straightforwardly from equation (26), noting that $\frac{\partial \mid \phi_J - \phi_I \mid}{\partial \mid \sigma_{p,J}{}^2 - \sigma_{p,I}{}^2 \mid} > 0$.

PROPOSITION 3: The probability that the incumbent survives the election increases with his quality:

$$(27) \quad \frac{d \Pr(S = \bar{S} \mid q)}{d q} > 0 \ .$$

The resulting selection bias implies that the expectation of the incumbent's quality conditional on survival is strictly positive:

$$(28) \quad E(q \mid S = \bar{S}) > 0 \ .$$

The size of the selection bias increases with the degree to which each voter is informed:

$$(29) \quad \frac{d E(q \mid S = \bar{S})}{d \left(\sigma_{p,h}{}^2\right)} < 0 \ .$$

PROOF:

Compared to an incumbent of low quality, a high quality type has better re-election chances because voters are more likely to experience favorable policy outcomes. Formally, equation (27) in Proposition 3 follows from

$$(30) \quad \frac{d \Pr(S=\bar{S} \mid q)}{d q} = \sum_{h=1}^{N} \left[\frac{\partial \Pr[S=\bar{S} \mid \Pr(v_h=1)]}{\partial \Pr(v_h=1)} \ \frac{\partial \Pr(v_h=1 \mid q)}{\partial q} \right] = \varepsilon \sum_{h=1}^{N} \left[\frac{\partial \Pr(v_h=1 \mid q)}{\partial q} \right] =$$

$$\varepsilon \sum_{h=1}^{N} \left[\frac{\partial \Pr[\Pi_h \geq -\frac{1}{2}(a_1 * - \hat{a}_h)^2]}{\partial q} \right] = \varepsilon \sum_{h=1}^{N} \left[\frac{\partial \Pr(p_h \geq -q)}{\partial q} \right] = \varepsilon \sum_{h=1}^{N} \left[\frac{\partial [1 - G_h(-q)]}{\partial q} \right] = \varepsilon \sum_{h=1}^{N} [g_h(-q)] > 0$$

,

where G_h and g_h are the cumulative and probability distribution functions of p_h, respectively.

A political survivor -- a re-elected incumbent -- tends to be of above-average quality. Formally, equation (28) in Proposition 3 can be rewritten as

$$(31) \quad E\left(q \mid \sum_{h=1}^{N} v_h \geq \frac{N+1}{2}\right) > 0 \ ,$$

which holds if

$$(32) \quad \Pr(q > 0 \mid v_h = 1) > \Pr(q \leq 0 \mid v_h = 1) \ .$$

Applying Bayes' Rule, the expressions on the left and right hand sides of equation (32) can be rewritten as

$$(33) \quad \Pr(q > 0 \mid v_h = 1) = \frac{\Pr(v_h = 1 \mid q > 0)\Pr(q > 0)}{\Pr(v_h = 1 \mid q > 0)\Pr(q > 0) + \Pr(v_h = 1 \mid q \leq 0)\Pr(q \leq 0)} \ ,$$

$$(34) \quad \Pr(q \leq 0 \mid v_h = 1) = \frac{\Pr(v_h = 1 \mid q \leq 0)\Pr(q \leq 0)}{\Pr(v_h = 1 \mid q > 0)\Pr(q > 0) + \Pr(v_h = 1 \mid q \leq 0)\Pr(q \leq 0)} \ .$$

Since q is symmetrically distributed around zero, and noting that $q = 0$ is a zero probability event, it holds that $\Pr(q > 0) = \Pr(q \leq 0)$. Equation (32) is thus equivalent to

$$(35) \quad \Pr(v_h = 1 \mid q > 0) > \Pr(v_h = 1 \mid q \leq 0) \ .$$

Equation (35) follows from equation (30), thereby establishing the validity of equation (28) in Proposition 3.

A better informed voter can disentangle more effectively the effects of candidate quality and other random factors on observed policy outcomes. Voter information thus improves the selection bias. Formally, equation (29) in Proposition 3 holds because

$$(36) \quad \frac{\partial\left[\Pr(q > 0 \mid v_h = 1) - \Pr(q \leq 0 \mid v_h = 1)\right]}{\partial\left(\sigma_{p,h}{}^2\right)} < 0 \ ,$$

or, equivalently [compare the derivation in equations (32)-(35)],

$$(37) \quad \frac{\partial\left[\Pr(v_h = 1 \mid q > 0) - \Pr(v_h = 1 \mid q \leq 0)\right]}{\partial\left(\sigma_{p,h}{}^2\right)} =$$

$$\frac{\partial\left(\Pr[\Pi_h \geq -\frac{1}{2}(a_1 * - \hat{a}_h)^2 \mid q > 0] - \Pr[\Pi_h \geq -\frac{1}{2}(a_1 * - \hat{a}_h)^2 \mid q \leq 0]\right)}{\partial\left(\sigma_{p,h}{}^2\right)} =$$

$$\frac{\partial\left[\Pr(p_h \geq -q \mid q>0)-\Pr(p_h \geq -q \mid q \leq 0)\right]}{\partial\left(\sigma_{p,h}{}^2\right)}=\frac{\partial\left[-G_h(-q \mid q>0)+G_h(-q \mid q \leq 0)\right]}{\partial\left(\sigma_{p,h}{}^2\right)}<0\ ,$$

noting that $\sigma_{p,h}{}^2$ is the variance of the probability distribution function g_h.

PROPOSITION 4: The policy bias reduces first-period aggregate welfare:

$$(38)\qquad \frac{d\left(\sum_{h=1}^{N} U_h{}^{t=1}\right)}{d\,|\,a_1{}^*-a_2{}^*\,|}<0\ .$$

The selection bias increases second-period expected aggregate welfare:

$$(39)\qquad \frac{d\left(E\sum_{h=1}^{N} U_h{}^{t=2}\right)}{d\,E(q \mid S=\bar{S})}>0\ .$$

PROOF:

First-period welfare is given by

$$(40)\qquad \sum_{h=1}^{N} U_h{}^{t=1}=-\frac{1}{2}(\hat{a}_J-\hat{a}_I)^2\,\frac{M(N-M)\left[M(1+\phi_J\bar{S}\varepsilon)^2+(N-M)(1+\phi_I\bar{S}\varepsilon)^2\right]}{\left[M(1+\phi_J\bar{S}\varepsilon)+(N-M)(1+\phi_I\bar{S}\varepsilon)\right]^2}\ ,$$

second-period expected welfare by

$$(41)\qquad E\sum_{h=1}^{N} U_h{}^{t=2}=-\frac{1}{2}(\hat{a}_J-\hat{a}_I)^2\,\frac{M(N-M)}{N}+\frac{1}{2}\,E(q \mid S=\bar{S})\,N\ ,$$

noting that the unconditional probability of survival, $\Pr(S=\bar{S})$, is equal to one half.

In the first-period there is no potential for a selection bias, only for a policy bias. The expression $-\frac{1}{2}(\hat{a}_J-\hat{a}_I)^2\frac{M(N-M)}{N}$, which reflects second-period expected welfare minus the expected gains from the selection bias, thus serves as a normative benchmark allowing us to assess the welfare costs of the first-period policy bias. The difference between this benchmark and first-period welfare is strictly positive,

$$(42)\quad E\sum_{h=1}^{N} U_h^{t=2} - \frac{1}{2}E(q \mid S=\bar{S})\,N - \sum_{h=1}^{N} U_h^{t=1} = \frac{\frac{1}{2}(\hat{a}_J - \hat{a}_J)^2\,(\phi_J - \phi_I)^2\,\bar{S}^2\,\varepsilon^2\,M(N-M)}{N[M(1+\phi_J\bar{S}\varepsilon) + (N-M)\,(1+\phi_I\bar{S}\varepsilon)]^2} > 0\ ,$$

implying that the policy bias is associated with a welfare loss. The favored group thus gains less than the disfavored group loses.

In the second period, there is no potential for a policy bias, only for a selection bias. Equation (28) implies that the amount by which the selection bias increases second-period expected welfare, $\frac{1}{2}\,E(q \mid S=\bar{S})\,N$, is strictly positive.

5 Group Size and Endogeneous Informationa Asymmetries

The results presented so far are based on an exogeneously given informational disparity between the majority and minority. This section endogenizes the informational asymmetry by examining the incentives of the members of each group to become informed, or to acquire a lower-variance monitor of political performance, at a cost privately incurred by each individual. Each voter chooses how many resources to invest in gathering information. By becoming better informed, the individual can bias policy in her favor, or partly undo a policy bias favoring the opposing group; and she can improve the selection bias.

The private cost of information gathering in conjunction with the collective implications of the policy and selection biases imply that the individuals' information gathering decisions are subject to a free rider problem. This problem is conceptually more complicated than the standard one. A within-group free rider problem is nested in a free rider problem shared by the entire electorate. With regard to the policy bias, each individual has goals in common with one group of individuals, whereas her goals conflict with those of the other group. A free rider problem arises because she would prefer other members of her group to bear the costs of information gathering. But in addition, she has competitive incentives to gather information in order to undo the effect of the informational investments made by the opposing group. With regard to the selection bias, both groups have a common goal: to gather information in order to increase the expected quality of the future incumbent. This collective enterprise is subject to a free rider problem common to all voters.

Given the importance of group size in standard analyses of the free rider problem, it is clearly of interest to examine the degree to which each group is able to overcome this problem as a function of its size. I analyze whether asymmetries in group size translate into an informational disparity that in turn causes a policy bias. From a welfare perspective, I examine whether information is under- or oversupplied in equilibrium.

In a pre-stage to the game analyzed above, voter h decides whether to acquire costly information (see Figure 1). Her choice variable is the private cost of information gathering, c_h, which enters her utility function additively. The aggregate costs of information acquisition affect the utility function of political candidates who care about aggregate welfare. However, the informational costs are sunk at the time of the first-period incumbent's and election winner's decisions so that their equilibrium strategies are not affected.

I now turn to the specification of the information gathering technology. For an individual h who remains totally uninformed, the variance $\sigma_{p,h}{}^2$ of the process shock p_h approximates infinity. As the voter gathers more information, the variance $\sigma_{p,h}{}^2$ decreases, with decreasing marginal returns from information gathering, and goes to zero as the individual becomes fully informed. It is useful to specify the information gathering technology in terms of the parameter $\phi_h \equiv f_h(0)$, which is inversely correlated with $\sigma_{p,h}{}^2$, ranging from one to zero as $\sigma_{p,h}{}^2$ varies from zero to infinity. For the sake of concreteness, I assume a specific functional form:

(43) $\quad \phi_h = \sqrt{c_h}$,

where $c_h \in [0,1]$; the endpoints of the unit interval correspond to the cases where voter h remains uninformed and where she becomes perfectly informed, respectively.

PROPOSITION 5: All individuals become partially informed, but each member of the minority invests more resources in information gathering than does each member of the majority:

(44) $\quad 0 < c_J{}^* < c_I{}^* < 1$.

PROOF:

The formal analysis makes use of the individual indices $j = 1, \ldots, M$ and $i = M+1, \ldots, N$, even though in equilibrium the members of each group invest identical resources in information gathering. The reason is that each individual takes as given the equilibrium amount of information purchased by all other individuals, including the members of her own group.

Individual j chooses the cost c_j that maximizes her two-period expected utility

$$(45)\quad -c_j + U_j^{t=1}\left(\phi_j(c_j)\right) + EU_j^{t=2}\left(\phi_j(c_j)\right) = -c_j - \frac{1}{2}(\hat{a}_J - \hat{a}_I)^2 \frac{(N-M)^2\,(1+\phi_I \bar{S}\varepsilon)^2}{[N+\phi_j \bar{S}\varepsilon+(M-1)\,\phi_J \bar{S}\varepsilon+(N-M)\,\phi_I \bar{S}\varepsilon]^2} - \frac{1}{2}(\hat{a}_J - \hat{a}_I)^2 \frac{(N-M)^2}{N^2} + \frac{1}{2}E(q \mid S = \bar{S})\ .$$

Her first-order condition is given by

(46)

$$\frac{d\left[-c_j + U_j^{t=1}\left(\phi_j(c_j)\right) + EU_j^{t=2}\left(\phi_j(c_j)\right)\right]}{d\,c_j} = -1 + \frac{\partial\, U_j^{t=1}}{\partial\,\phi_j}\frac{\partial\,\phi_j}{\partial\,c_j} + \frac{1}{2}\frac{\partial\, E(q \mid S=\bar{S})}{\partial\,\phi_j}\frac{\partial\,\phi_j}{\partial\,c_j} =$$

$$-1 + \frac{(\hat{a}_J - \hat{a}_I)^2\,(N-M)^2\,(1+\phi_I \bar{S}\varepsilon)^2\,\bar{S}\varepsilon}{[N+\phi_j \bar{S}\varepsilon+(M-1)\,\phi_J \bar{S}\varepsilon+(N-M)\,\phi_I \bar{S}\varepsilon]^3}\frac{1}{2\sqrt{c_j}} + \frac{1}{2}\frac{\partial\, E(q \mid S=\bar{S})}{\partial\,\phi_j}\frac{1}{2\sqrt{c_j}} = 0\ .$$

Substituting equation (43) into equation (46), and noting that $\phi_j = \phi_J$ in equilibrium, equation (46) can be rewritten as

$$(47)\quad -1 + \frac{1}{2\phi_J}\frac{(\hat{a}_J - \hat{a}_I)^2\,(N-M)^2\,(1+\phi_I \bar{S}\varepsilon)^2\,\bar{S}\varepsilon}{[N+M\phi_J \bar{S}\varepsilon+(N-M)\phi_I \bar{S}\varepsilon]^3} + \frac{1}{4\phi_J}\frac{\partial\, E(q \mid S=\bar{S})}{\partial\,\phi_j}\Big|_{\phi_j=\phi_J} = 0\ .$$

The corresponding equilibrium first-order condition for an individual of type I is given by

$$(48)\quad -1+\frac{1}{2\phi_I}\frac{(\hat{a}_J-\hat{a}_I)^2M^2(1+\phi_J\bar{S}\varepsilon)^2\,\bar{S}\varepsilon}{[N+M\phi_J\bar{S}\varepsilon+(N-M)\phi_I\bar{S}\varepsilon]^3}+\frac{1}{4\phi_I}\frac{\partial E(q\mid S=\bar{S})}{\partial\phi_i}\Big|_{\phi_i=\phi_I}=0\ .$$

Substituting equation (47) into equation (48) and simplifying, the following equation obtains:

$$(49)\quad \frac{(\hat{a}_J-\hat{a}_I)^2\,\bar{S}\varepsilon}{[N+M\phi_J\bar{S}\varepsilon+(N-M)\phi_I\bar{S}\varepsilon]^3}\left[\phi_I(N-M)^2(1+\phi_I\bar{S}\varepsilon)^2-\phi_J M^2(1+\phi_J\bar{S}\varepsilon)^2\right]$$

$$+\frac{1}{2}\left[\phi_I\frac{\partial E(q\mid S=\bar{S})}{\partial\phi_j}\Big|_{\phi_j=\phi_J}-\phi_J\frac{\partial E(q\mid S=\bar{S})}{\partial\phi_j}\Big|_{\phi_j=\phi_J}\right]=0.$$

According to equation (49), $M>N-M$ implies $\phi_J<\phi_I$. Moreover, the assumption of diminishing marginal returns from costly information gathering eliminates corner solutions ($\phi_J=\phi_I=0$ or $\phi_J=\phi_I=1$). It follows that $0<c_J{}^*<c_I{}^*<1$. All voters become partially informed, but a voter of type J invests less resources in information gathering than does a voter of type I, as stated in equation (44) in Proposition 5. (The latter result does not imply that the minority group as a whole gathers more information than does the majority group as a whole, nor is this possibility excluded.) The informational asymmetry $\sigma_{p,J}{}^2<\sigma_{p,J}{}^2$ thus arises endogeneously, implying that policy will be biased toward the special interest at the expense of the general public.

The uniqueness-of-equilibrium result continues to hold when the equilibrium play characterized in Proposition 1 is preceded by an information gathering stage as specified above. The assumption of diminishing marginal returns from costly information acquisition is crucial for the uniqueness of the individuals' informational investments.

PROPOSITION 6: The relative size of the informational investments made by the members of the majority and minority groups decreases with the relative size of the majority:

$$(50)\quad \frac{c_J{}^*(M)}{c_I{}^*(M)}<\frac{c_J{}^*(M-1)}{c_I{}^*(M-1)}\ \textit{for fixed } N\ .$$

The degree to which each individual becomes informed decreases with the number of voters, converging to zero as the size of the electorate goes to infinity:

(51) $c_h^*(N) < c_h^*(N-1)$; $c_h^* \to 0$ *as* $N \to \infty$.

PROOF:

Equation (50) in Proposition 6 is implied by equation (49), noting that $\phi_h = \sqrt{c_h}$. The smaller is the special interest group, the less severe is its within-group free-rider problem compared to the corresponding problem faced by the general public.

Equation (52) follows straightforwardly from equations (47) and (48), noting that $\varepsilon(N) < \varepsilon(N-1)$ and $\varepsilon \to 0$ as $N \to \infty$. As the number of voters increases, the individuals' incentives to contribute to policy and selection effects are increasingly muted because the probability that any one vote is decisive, ε, goes to zero. In the limit, for infinite N, no individual becomes informed because no single vote affects the electoral outcome.

PROPOSITION 7: From an aggregate welfare perspective, information may be under- or oversupplied in equilibrium:

(52) $c_h^* \gtrless \bar{c}$,

where $\bar{c}$ is the welfare-maximizing value of c_h.

PROOF:

Equation (38) implies that information gathering efforts driven by the policy bias lead to a social deadweight loss. From a welfare perspective, it is optimal for all individuals to be equally well-informed: the welfare-maximizing value of c_h, $\bar{c}$, is identical for all h. Thus, the deadweight cost of information gathering privately incurred by each individual must be traded off only against the collective gains generated by the resulting increase in the selection bias. The socially optimal $\bar{c}$ thus solves the first order condition

$$(53) \quad \frac{d\left[-c_h + \sum_{h=1}^{N} U_h^{t=1}\left(\phi_h(c_h)\right) + \sum_{h=1}^{N} EU_h^{t=2}\left(\phi_h(c_h)\right)\right]}{d\, c_h} =$$

$$-1 + \frac{N}{4\sqrt{c_h}} \frac{\partial E(q \mid S = \bar{S})}{\partial \phi_h}\Big|_{c_h = \bar{c}} = -1 + \frac{N}{4\,\phi_h} \frac{\partial E(q \mid S = \bar{S})}{\partial \phi_h}\Big|_{\phi_h = \bar{\phi}} = 0 \ ,$$

where $\bar{\phi} = \sqrt{\bar{c}}$. A comparison of this first-order condition with the equilibrium first-order conditions (47) and (48) shows that informational investments driven by the counterproductive policy bias are oversupplied independent of their size. In contrast, information gathering efforts driven by the selection bias are undersupplied by a factor of N. This factor reflects the severity of the free rider problem shared by the entire electorate. The net effect is ambiguous, as stated in equation (52) in Proposition 7. The result that information may be oversupplied is interesting insofar as it contradicts the standard intuition according to which voluntary and costly contributions to a public good will be suboptimally low.

6 Discussion

This analysis develops a precise intuition explaining why an incumbent can achieve a net gain in political support when he biases policy toward a minority of voters at the expense of a majority, even if the losses incurred by the general public exceed the gains enjoyed by special interests. Each voter would like to re-elect an incumbent of above-average quality, but she cannot fully disentangle the contribution of the incumbent's quality and other forces driving the observed policy outcome. She may experience a favorable policy outcome because the incumbent is a high-quality candidate; because policy is biased in her favor; or because she is lucky. Based on the observed policy outcome, the voter forms an inference about the incumbent's quality. She does so by solving a signal extraction problem that assigns weights to various factors that influence the observed policy outcome, where the weight placed on any one factor decreases with the degree of uncertainty associated with the factor. If the extent to which the observed outcome is favorable exceeds a critical threshold, she casts her vote for the incumbent; otherwise she votes for the challenger. The incumbent can mimic an increase in quality vis-à-vis special interests by biasing policy in their favor, at the expense of an apparent decrease in quality vis-à-vis the general public. Compared to the ill-informed majority, the well-informed minority places a higher weight on the possibility that the observed policy outcome is caused by the policymaker's quality. The reason is that the signal extraction problem solved by special interests is subject to less "noise" confounding their inferences. As a consequence, the incumbent gains more political support among members of the minority than he loses among members of the majority. By continuity, this argument holds even if the policy bias is associated with some inefficiency.

In equilibrium the incumbent's attempt to fool the voters is futile. By opportunistically biasing policy toward special interests, the incumbent cannot systematically improve his re-election chances. This implication follows from the assumption that voters are rational: their signal extraction problem takes into account the effect of the incumbent's manipulations on observed policy outcomes. Nevertheless, the incumbent is trapped into producing a counterproductive policy bias because voters expect him to favor special interests. If he failed to satisfy their expectations, he would reduce his re-election chances to an unacceptable level. Thus, the voters' expectations are fulfilled in equilibrium.

The voters' anticipation of policy and selection biases creates incentives to acquire better monitors of political performance. The private costs of information acquisition in conjunction with the collective consequences of policy and selection biases imply that the individuals' information gathering efforts are subject to a free rider problem. With regard to the policy bias, each individual would prefer other members of her group to bear the costs of information gathering, but she also has competitive incentives to gather information in order to offset the informational investments made by the opposing group. Asymmetries in group size translate into an informational disparity which in turn causes a counterproductive policy bias. From a welfare perspective, information is oversupplied in equilibrium to the extent that information gathering efforts are driven by the counterproductive policy bias. With regard to the selection bias, all voters have incentives to become better informed in order to improve the expected quality of the future incumbent. This collective enterprise is subject to the standard free rider problem. Information is undersupplied in equilibrium to the extent that information acquisition is driven by the selection bias. The net effect is ambiguous.

The analysis suggests that small groups are favored because they are better able to overcome the free rider problem of becoming informed, compared to large groups. However, the model does not exclude the possibility of a policy bias toward large groups when they are relatively well-informed for reasons exogeneous to the model. For example, small business and senior citizens in the United States are generally well-informed about how their political representatives voted on small-business exemptions and social security. My informational hypothesis is consistent with the pervasiveness of regulatory exceptions for small business and with the "politically untouchable" quality of social security.

Of course, small business and senior citizens may be politically powerful for another reason: they are well-organized interests. The informational hypothesis developed here can be extended to shed light on the role of interest group organization. An important function of political lobbies is to collect information about the activities of political representatives in a centralized way and then disperse this information among their members. The members of organized interest groups may also collect information in a decentralized way, in which case organization serves to pool their information. Either way, organized interests have access to better, or lower-cost, monitors of political performance.[6] The implied electoral threat pressures politicians to follow the lobbies' agenda. The literature has emphasized intra-group heterogeneity of interests as an important variable explaining whether a group of individuals will become politically organized and active (Russell Hardin, 1982 ch. 5). Future research might pay attention to the informational heterogeneity of a group, defined as the degree to which the political and economic shocks that undermine the political monitoring capability of group members are correlated.

My analysis also extends the literature on rational retrospective voting. Voters are differentially well-informed, and these informational differences arise endogeneously. Policymakers strategically choose to bias policy, and inefficiently so, for electoral reasons. This result is consistent with standard political business cycle models (e.g., William D. Nordhaus, 1975), according to which pre-election policy manipulations impact negatively on aggregate economic variables. In addition, my analysis implies that the policy bias will take the form of negatively-valued pre-election distributional effects, while the selection bias will lead to positively-valued post-election aggregate effects.

Lohmann (forthcoming) extends the analysis to more than one policy dimension, constructing an example with three voters and three dimensions. Each voter is a well-informed special interest on one dimension, where she benefits from a policy bias in her favor. On the other two dimensions, the voter is part of the ill-informed general public at whose expense policy is biased. In a highly stylized way, this example captures a collective dilemma modern democracies appear to be trapped in. Inefficient government policies favor special interests at the expense of the general public. While special interests form a minority on any one policy dimension, just about every citizen is a member -- whether active or not -- of at least one special interest group on some policy dimension. Each citizen prefers being favored by government policy even at the expense of inefficiencies imposed on the society

at large. But relative to the status quo involving inefficiencies on all policy dimensions, each citizen would be better off if government did not cater to special interests at all. Voters clamour for government to streamline and reduce the scope of its redistributive activities. But any serious attempt to implement the expressed wish of the general public requires cutting the pet programs of special interests, and any politician who would do so can count on being dead on arrival at the polls.

The informational argument developed here explains why political competition does not allow voters and their political representatives to break free of this multi-dimensional collective dilemma. At first glance, a political entrepreneur who stood for election offering to eliminate all the perks enjoyed by special interests would be elected by unanimous vote. But people cannot effectively monitor whether the candidate keeps his promise. Once elected, the office-motivated incumbent shares the incentives of his predecessors to cater to special interests.

The policy bias could be reduced if well-informed interest groups or political candidates dispersed information to the general public. (To some degree this already happens when interest groups monitor legislators' voting records and publish interest group ratings, or when political challengers attack the legislative records of incumbents they seek to unseat.) However, political competition is unlikely to fully eliminate the informational disparity across groups: the interests of potential information providers do not coincide with those of the general public, and their efforts to educate the public are subject to a free rider problem.

My analysis assumes that candidate quality is a "valence issue"; that is, candidates are linked with some condition that is valued positively or negatively by the entire electorate (Donald E. Stokes, 1963). In contrast, "position issues" involve government actions over which voters have conflicting preferences. One possible extension would allow candidates to be purely policy-motivated and differ in their policy preferences. Suppose each voter is incompletely informed about the candidates' policy ideal points. She only observes the policy outcome. Based on this observation, each voter forms an estimate of the distance between the incumbent's policy ideal point and her own. She compares this distance to the expected distance between the challenger's ideal point and her own and then votes for the candidate whose ideal point is expected to be closer. The incumbent thus faces a tradeoff. On the one hand, he can set policy so as to persuade the voters that his interests coincide

with theirs, thereby increasing his chances of survival. Being policy-motivated, the policymaker derives utility from being re-elected because he prefers himself to set policy rather than have policy be set by a candidate with different policy preferences. On the other hand, the more the incumbent accommodates any given voter, the larger is the distance between the policy and the incumbent's ideal point, and the lower is the policymaker's first-period utility. The incumbent trades off the second-period selection effects and the first-period policy effects on his utility level. This setting allows us to examine whether the policymaker accommodates well-informed voters to a greater extent than ill-informed voters.

Next, the policymaker's task might consist of distributing a "pie" among the electorate. For example, the incumbent might face the task of allocating a given amount of tax revenue toward transfers, subsidies, and the like. The question is whether a redistributional bias emerges, favoring well-informed voters at the expense of their ill-informed counterparts. Moreover, it would be of interest to examine whether and how the degree to which people become informed and thus contribute to a redistributional bias in their favor is influenced by the per capita stakes involved.

The policymaker might also choose between policy instruments characterized by different degrees of opaqueness or imperfect control (R. Douglas Arnold, 1991; Stephen Coate and Stephen Morris, 1994; Alberto Alesina and Alex Cukierman, 1990; Cukierman and Allan H. Meltzer, 1986). For example, Arnold (1991) argues that the degree to which political decisions are representative depends on the complexity of the causal chain that links policy instruments controlled by policymakers to policy effects experienced by their constituents. The more complex is this link, the greater is the degree to which incumbents can afford to follow policies that favor special interests at the expense of their constituents. Policymakers may deliberately use opaque policy instruments in order to prevent their constituents from becoming aware of the policy bias toward special interests.

Finally, I would like to pay homage to the article that originally motivated this research program. Bengt Holmstrom and Paul Milgrom (1991) develop a principal-agent model in which the agent has multiple tasks with competing demands on the agent's time and attention. The principal can measure the agent's performance on some tasks more easily than on other tasks. If the principal provides a high-powered incentive scheme for activities that are more easily monitored, the agent will bias his efforts toward those

activities. In this situation, the optimal incentive contract may involve a low-powered scheme such as paying the agent a fixed wage independent of measured performance. Since the principal deliberately foregoes monitoring the agent, this second-best solution is associated with some deadweight loss.

In comparison, I develop a political principal-agent model with one agent (a policymaker) and multiple principals (voters). Voters cannot write incentive contracts for the policymaker. Instead, they can vote him out of office if they are dissatisfied with his performance. The policymaker has only one task: he supplies a differentiated-benefits collective good. Voters differ in the degree to which they can monitor the incumbent's performance. As a consequence, the policymaker has an incentive to bias policy in favor of voters who have better monitors of his performance. This bias in turn creates competitive incentives for voters to become informed. Their incentives are muted by the free rider problem associated with costly monitoring. In equilibrium, a policy bias arises if voters' incentives to become informed are asymmetric, for example, because their preferences or numbers are distributed asymmetrically.

Arguably, term limits are the political equivalent of a low-powered incentive scheme. In my model, incumbents who are prevented from running for re-election do not have incentives to bias policy. (Clearly, this conclusion depends on the assumption that policymakers care about aggregate welfare. In practice, incumbents facing electoral termination might accommodate special interests who control their future career paths.) But the term limit solution is imperfect because it foregoes the selection gains generated by the voters' retrospective decision rule.

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Endnotes

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[1] Examples are leadership skills, competence in forging legislative coalitions, economic or foreign policy expertise, effectiveness in dealing with corruption or government waste, ability to create a political environment that is conducive to economic growth, and the like.

[2] For analytical simplicity, candidate quality enters the utility function additively. For some interpretations of candidate quality, the separability of the policymaker's action and his quality might be considered implausible. An alternative specification would have the distance between the policymaker's action and the voters' ideal points depend on the unknown state of the world. High-quality candidates would have more accurate (lower-variance) estimates of the state of the world than would low-quality candidates, with positive consequences for the voters' (quadratic) utilities. The qualitative results of the analysis are robust with respect to this alternative specification.

[3] The equilibrium is unique up to events of probability zero (specifically, $q + p_h = 0$).

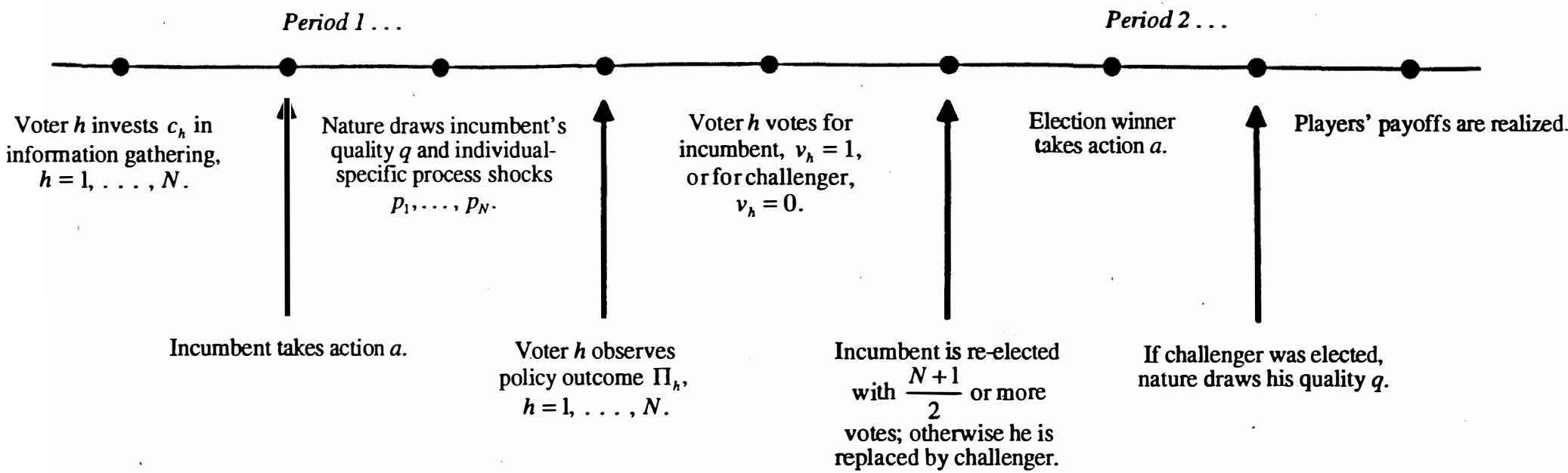
[4] In their analysis of the swing voter's curse, Feddersen and Pesendorfer (forthcoming) come to the surprising conclusion that voters may abstain even when voting is costless. It is useful to examine why this abstention result does not obtain in my model. In Feddersen

and Pesendorfer's model, voters prefer either the status quo or a policy alternative as a function of the unknown state of the world, which takes on one of two values. Some voters receive a partially informative signal about the state of the world, while others remain uninformed. Informed voters condition their vote on their private information. Uninformed voters may abstain to increase the impact of the votes cast by their informed counterparts, thereby increasing the likelihood of obtaining the "right" voting outcome. In my model, voters also have a common interest: after discounting the (differential) effects of the incumbent's first-period action on their utility, they share the desire to retain an incumbent of above-average quality. But each voter is partially informed about the incumbent's quality, which is drawn from a continuum. Her private information determines on which side of the voting cutpoint she ends up. Except for events of probability zero, she has a strict preference to vote for or against the incumbent.

[5] For this reason, the equilibrium is unique only up to events of probability zero; see fn. 2.

[6] Formally, the decision to join an organized group at a private cost corresponds to the decision to acquire a better monitor of political performance at a cost. This decision is a binary one, amounting to a choice between a low or high level of information. In contrast, the informational investment analyzed in Section IV can take on any value on a continuum. The analysis would have to be modified accordingly.

FIGURE 1. TIME LINE



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